

REMARKS

In response to the outstanding Office Action, Paper No./Mail Date 20060817, dated August 28, applicant has carefully studied the references cited by the Examiner and the Examiner's comments relative thereto.

Claims 1-10 remain in the application for reconsideration by the Examiner.

No new matter has been added.

Reconsideration of the application is respectfully requested.

The Examiner rejected Claims 1-3 and 5-10 under 35 USC 103(a) as being unpatentable over primary references U.S. Patent No. 4,622,001 to Bright et al. (Bright) in view of secondary reference U.S. Patent No. 5,411,686 to Hata (Hata).

The Examiner stated:

"Claims 1-3 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bright (USPN 4622001) in view of Hata (USPN 5411686). As to Claim 1, Bright teaches a process for preparing an article which could be used as a blow molding preform (entire document), comprising:

melting polymer in a plasticating extruder, to prepare a homogeneous stream of hot polymer melt at the discharge of the extruder (1:55-57);

cooling the polymer melt stream by heat exchange with a liquid heat transfer medium (2:1-15); and

forming the cooled polymer melt into a blow molding preform (2:6, the article of Bright is capable of being used as a blow molding preform).

"Bright is silent to (a) flakes of polymer, (b) a screw extruder, and (c) cooling the melt stream to a temperature at least 20 degrees Centigrade below the extruder discharge temperature. However, these aspects would have been prima facie obvious for the following reasons:

(a) Hata teaches flakes (Fig. 16, Item 8), which is a well known method of delivering feedstock

(b) Hata teaches a screw extruder (Fig. 16), which is a well known method of melting and delivering polymer

(c) Bright teaches that the mold (Fig. 1, Item 50), and the nozzle leading to the mold (Fig. 3, Item 92), are each cooled with a heat transfer liquid being maintained at a temperature of less than 10 degrees C (1:63-68). Because the heat transfer liquid is at a temperature significantly lower than the melt, it is the Examiner's position that a temperature drop of at least 20 degrees Centigrade during flow of material into and through the cooled mold would have been an implicit aspect of Bright's invention.

"It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Hata into that of Bright because pellets or "flakes" would fit well into the hopper or feedstock inlet, and because Bright clearly suggests plasticating the mixture, which Hata's method would achieve. As to Claims 2 and 3, Bright teaches PET (1:55). As to Claims 5 and 6, Bright teaches above about 275 degrees C (1:57). As to Claim 7, Bright teaches a process for preparing an article which could be used as a blow molding preform (entire document), comprising:

melting polymer comprising polyethylene terephthalate (1:55), in a plasticating extruder to prepare a homogeneous stream of hot polymer melt at the discharge of the extruder (1:57-58), the temperature of the polymer melt at the discharge of the extruder being about 275 degrees C (1:57);

cooling the polymer melt stream by heat exchange with a liquid heat transfer medium (1:63-2:15); and

forming the cooled polymer melt into a blow molding preform (2:6, the article is inherently capable of being used as a blow molding preform).

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(c) Bright teaches that the mold (Fig. 1, Item 50), and the nozzle leading to the mold (Fig. 3, Item 92), are each cooled with a heat transfer liquid being maintained at a temperature of less than 10 degrees C (1:63-68). Because the heat transfer liquid is at a temperature significantly lower than the melt, it is the Examiner's position that a temperature drop of at least 20 degrees Centigrade during flow of material into and through the cooled mold would have been an implicit aspect of Bright's invention.

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melting polymer comprising polyethylene terephthalate (1:55), in a plasticating extruder to prepare a homogeneous stream of hot polymer melt at the discharge of the extruder (1:57-58), the temperature of the polymer melt at the discharge of the extruder being about 275 degrees C (1:57);

cooling the polymer melt stream by heat exchange with a liquid heat transfer medium (1:63-2:15); and

forming the cooled polymer melt into a blow molding preform (2:6, the article is inherently capable of being used as a blow molding preform).

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(c) Bright teaches that the mold (Fig. 1, Item 50), and the nozzle leading to the mold (Fig. 3, Item 92), are each cooled with a heat transfer liquid being maintained at a temperature of less than 10 degrees C (1:63-68). Because the heat transfer liquid is at a temperature significantly lower than the melt, it is the Examiner's position that a temperature drop of at least 20 degrees Centigrade during flow of material into and through the cooled mold would have been an implicit aspect of Bright's invention.

"It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Hata into that of Bright because pellets or "flakes" would fit well into the hopper or feedstock inlet, and because Bright clearly suggests plasticating the mixture, which Hata's method would achieve."

Applicant's invention as set forth in Claim 1 is directed to a process for preparing a blow molding preform. The process comprises the steps of:

- 1) melting polymer flakes in a plasticating screw extruder, to prepare a homogeneous stream of hot polymer melt at the discharge of the extruder;
- 2) cooling the polymer melt stream to a temperature at least 20 degrees Centigrade below the extruder discharge temperature, by heat exchange with a liquid heat transfer medium; and
- 3) forming the cooled polymer melt into a blow molding reform.

All of the dependant Claims 2-6 contain at least the same elements and limitations as Claim 1.

Applicant's invention as set forth in Claim 7 is directed to an alternative process for preparing a blow molding preform. The process comprises the steps of:

- 1) melting polymer flakes, comprising polyethylene terephthalate, polyolefin, polyester, polyamide, acrylonitrile acid ester, vinyl chloride, or a derivative, blend, or a copolymer thereof, in a plasticating screw extruder to prepare a homogeneous stream of hot polymer melt at the discharge of the extruder, the temperature of the polymer melt at the discharge of the extruder ranging from about 225 degrees Centigrade to about 325 degrees Centigrade;
- 2) cooling the polymer melt stream to a temperature at least 20 Centigrade below the extruder discharge temperature, by heat exchange with a liquid heat transfer medium; and
- 3) forming the cooled polymer melt into a blow molding preform.

All of the dependant Claims 8-10 contain at least the same elements and limitations as Claim 7.

Bright discloses injection molding machines having a unique mold cavity cooling system that decreases thermal transmission between the heated injection nozzle and the mold cavity. This is important, according to Bright, in order to increase cycle times. Without such a system for providing decreased thermal transmission, the heated injection nozzle, which nearly contacts the surface of the mold, would diminish the ability of cooling fluid in the region of the mold nearest the heated injection nozzle to adequately cool the injection molded article.

Bright discloses cooling the extruded polymer in only one location; viz; in the mold, by passing cooling fluid through the mold. To suggest that Bright teaches the cooling of a polymer melt by 20° C between the injection nozzle and the injection mold is incredulous.

Bright makes it clear that, only ... “[u]pon injection of the PET into the mold, it is necessary that the plastic be cooled very quickly to a temperature less than 100° C ...” (column 1, lines 57-59, emphasis added). Bright further states that ... “the mold is typically cooled with

the aid of a chilled heat transfer liquid circulated around the mold ...” (column 1, lines 64-66, emphasis added). Bright specifically states that ... “the object of the present invention [is] to provide enhanced cooling for the cavity member of a mold while providing enhanced insulation between that cavity element and an adjacent heated nozzle supplying the cavity element ...” (column 2, lines 11-15, emphasis added). In Bright’s illustrated embodiments of the injection molding machines, ... “thermal isolation is achieved between the nozzle assembly 12, 112 and the adjacent molded article 48, 148 by providing a space 15, 115 between the outer surface on the heated jacket 16, 116 and surface 57, 157 of cap 56, 156. This space 15, 115 provides a thermal break decreasing the heat transmission between the heated nozzle 12, 112 and the molded article 48, 148” (column 4, lines 57-64, emphasis added). Thus, the proximity of the hot injection nozzle will not affect the ability of the mold cooling fluid to fully cool the molded article; even in that area of the mold cavity nearest the hot nozzle.

Accordingly, Bright fails to teach or even remotely suggest at least the second and third of Applicant’s process steps, as recited in Claims 1-10.

Hata discloses a method and apparatus for controlling injection molding, to suppress fluctuations in the temperature of the resin injected into the mold cavity. In Hata’s device, ... “molten resin is adjusted in temperature in a temperature adjusting portion provided in a passage leading from an injection molding machine to the cavity ...” (columns 4, lines 33-36). In each disclosed embodiment, ... “[t]he temperature adjusting portion is provided with a heater for heating the molten resin residing in the temperature adjusting portion...” (column 4, lines 63-65, emphasis added). A controller calculates ... “a new target temperature of heating performed by the heater, in order to hold constant the molten resin temperature in the temperature adjusting portion...” (column 5, lines 10-13). For example, in Fig. 15, ... “[t]he hot-runner portion 3 is the temperature adjusting portion” (column 21, lines 65 and 66), and in Fig. 16, ... “[t]he barrel portion [of the extruder] 7 corresponds to the temperature adjusting portion ...” (column 22, lines 15 and 16).

Thus, Hata teaches that extruded polymer can be heated by a heater in a “temperature adjusting portion,” to insure consistent polymer temperature and properties, before it is injected into a mold cavity where it is subsequently cooled.

Hata does not cure the deficiencies of Bright. Hata does not suggest that Bright's polymer should be cooled at least 20° C before it is injected into Bright's mold cavity. To the contrary, Hata specifically teaches away from Applicant's step 2, teaching that polymer should be heated by a heater in a "temperature adjusting portion" before it is injected into the mold.

Applicant respectfully submits that the Examiner has failed to demonstrate the obviousness of Claims 1-3 and 5-10 under 35 USC 103(a), given Bright in view of Hata. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw this rejection.

The Examiner rejected Claim 4 under 35 USC 103(a) as being unpatentable over primary reference Bright in view of secondary references Hata and U.S. Patent No. 6,320,014 to Takahashi et al. (Takahashi).

The Examiner stated:

"Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bright (USPN 4622001) in view of Hata (USPN 5411686) and further in view of Takahashi (USPN 6320014). Bright and Hata teach the subject matter of Claim 1 above under 35 USC 103(a). As to Claim 4, Bright appears to be silent to the claimed particle size. The Examiner asserts that in this case the size of the particle fed into a melt extruder does not materially affect the claimed process, and that any particle size would have been prima facie obvious to the ordinary artisan. However, Takahashi also teaches pellets having an average diameter of 5 mm comprising polyethylene terephthalate (10:10-15). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Takahashi into that of Bright in order to a) provide a dry feed line of material to an injection molding machine or extruder, b) provide pellets that are prevented from scorching, and c) to provide bottles of polyester having excellent properties such as high strength (All are found in Takahashi, 14: 49-62)).

"Rejections set forth above are based on the Examiner's position that the claimed temperature drop is an implicit aspect of the method of Bright. However, if it is ultimately found that the claimed temperature drop cannot be considered to be an implicit aspect of that reference, then the following claim rejections are also believed to render the claimed invention prima facie obvious and are presented additionally in order to expedite prosecution:"

Takahashi discloses polyester pellets. Takahashi does not discuss the injection molding of preforms. Takahashi does not cure the deficiencies of Bright in view of Hata, as discussed above.

Applicant respectfully submits that the Examiner has failed to demonstrate the obviousness of Claim 4 under 35 USC 103(a), given Bright in view of Hata and Takahashi. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw this rejection.

The Examiner rejected Claims 1-3 and 5-10 under 35 USC 103(a) as being unpatentable over primary reference U.S. Patent No. 4,988,279 to Belcher (Belcher) in view of secondary reference U.S. Patent No. 4,642,043 to Schwarzkopf (Schwarzkopf).

The Examiner stated:

"Claims 1-3 and 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Belcher (USPN 4988279) in view of Schwarzkopf (USPN 4642043). As to Claim 1, Belcher teaches a process for preparing a blow molding preform (4:16-27), comprising:

melting polymer flakes (12:20) in a plasticating screw extruder, to prepare a homogeneous stream of hot polymer melt at the discharge of the extruder (2:41 and 4:1-5); cooling the polymer melt stream at least 20 degrees C (4:7-10); and forming the cooled polymer melt into a blow molding preform (disclosure in 4:16-23 is interpreted to be a preform).

"Belcher is silent to (a) cooling after discharging from the extruder, and (b) cooling with a liquid heat transfer medium. However, these aspects would have been prima facie obvious for the following reasons:

(a) The particular order of cooling and discharging does not distinguish the invention from Belcher, who teaches cooling then simultaneous discharging and forming of the polymer into a tubular preform. The same temperature drop is provided.

(b) Schwarzkopf provides a liquid heat transfer medium for use in "synthetic resin processing machines" (1:17).

"It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Schwarzkopf into that of Belcher because doing so would adjust the temperature actively by cooling so as to better maintain the material within the optimal and narrow temperature range (2:11-20). As to Claims 2 and 3, Belcher teaches PET (4:1-30). As to Claims 5 and 6, Belcher teaches 260-290 C (4:5). As to Claim 7, Belcher teaches a process for preparing a blow molding preform (4:16-27), comprising:

melting polymer flakes of PET (12:20) in a plasticating screw extruder, to prepare a homogeneous stream of hot polymer melt at a temperature of 260 C to 290 C (2:41 and 4:1-5); cooling the polymer melt stream at least 20 degrees C (4:7-10); and forming the cooled polymer melt into a blow molding preform (disclosure in 4:16-23 is interpreted to be a preform).

"Belcher is silent to (a) cooling after discharging from the extruder, and (b) cooling with a liquid heat transfer medium. However, these aspects would have been prima facie obvious for the following reasons:

(a) The particular order of cooling and discharging does not distinguish the invention from Belcher, who teaches cooling then simultaneous discharging and forming of the polymer into a tubular preform. The same temperature drop is provided.

(b) Schwarzkopf provides a liquid heat transfer medium for use in "synthetic resin processing machines" (1:17).

"It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Schwarzkopf into that of Belcher because doing so would adjust the temperature actively by cooling so as to better maintain the material within the optimal and narrow temperature range (2:11-20). As to Claim 8, Belcher teaches PET (4:1-30). As to Claims 9, Belcher teaches 260 to 290 C (4:5). As to Claim 10, Belcher teaches a process for preparing a blow molding preform (4:16-27), comprising:

melting polymer flakes of PET (12:20) in a plasticating screw extruder, to prepare a homogeneous stream of hot polymer melt at a temperature of 260 C to 290 C (2:41 and 4:1-5); cooling the polymer melt stream at least 20 degrees C (4:7-10); and forming the cooled polymer melt into a blow molding preform (disclosure in 4:16-23 is interpreted to be a preform).

“Belcher is silent to (a) cooling after discharging from the extruder, and (b) cooling with a liquid heat transfer medium. However, these aspects would have been prima facie obvious for the following reasons:

(a) The particular order of cooling and discharging does not distinguish the invention from Belcher, who teaches cooling then simultaneous discharging and forming of the polymer into a tubular preform. The same temperature drop is provided.

(b) Schwarzkopf provides a liquid heat transfer medium for use in "synthetic resin processing machines" (1:17).

“It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Schwarzkopf into that of Belcher because doing so would adjust the temperature actively by cooling so as to better maintain the material within the optimal and narrow temperature range (2:11-20).”

Belcher discloses apparatus for extrusion blow molding. PET is conditioned within an extruder, extruded into a set of traveling molds, and blown into plastic articles. A molten polymer conditioning process takes place within the screw extruder, where the temperature of the molten polymer is allowed to decrease as the polymer moves toward the exit of the extruder, to attain a temperature between about 490° F and 520° F (column 4, lines 7-10). Thus, cooling, without the use of a liquid heat transfer medium, occurs naturally along the length of the barrel of the extruder.

Belcher does not teach nor even remotely suggest at least the second step of Applicant's claimed process; viz, cooling the polymer stream to a temperature at least 20° C below the extruder discharge temperature, by heat exchange with a liquid heat transfer medium. In Belcher's device, ... “[t]he temperature of the PET is ... decreased as it travels along the extruder ...” (column 3, lines 40 and 41). There is no cooling by heat exchange with a liquid heat transfer medium along the barrel of the extruder. In fact, there is no cooling at all after the discharge nozzle of the extruder, and certainly no teaching that the polymer discharged from the extruder must be cooled at least 20° C by any means.

Schwarzkopf discloses a device for heating and fluid cooling the nozzle of an injection molding machine. The purpose for this device is to be able to operate the injection molding nozzle... “within narrow temperature tolerances...” (column 2, lines 21 and 22). Thus, heating or cooling occurs in the wall of the extruder nozzle; not between the nozzle and the mold. Certainly, there is no teaching of at least step 2 of Applicant's process; that the polymer is to be cooled by at least 20° C between the discharge of the extruder and the mold. In fact, Schwarzkopf fails to disclose any process temperatures for conditioning then injecting the polymer into a mold cavity.

Schwarzkopf fails to cure the deficiencies of Belcher. Neither Belcher nor Schwarzkopf, nor their combination, teaches at least Applicant's process step 2.

Applicant respectfully submits that the Examiner has failed to demonstrate the obviousness of Claims 1-3 and 5-10 under 35 USC 103(a), given Belcher in view of Schwarzkopf. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw this rejection.

The Examiner rejected Claim 4 under 35 USC 103(a) as being unpatentable over primary reference Belcher in view of secondary reference Schwarzkopf and Takahashi.

The Examiner stated:

"Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Belcher (USPN 4988279) in view of Schwarzkopf (USPN 4642043) and further in view of Takahashi (USPN 6320014). Belcher and Schwarzkopf teach the subject matter of Claim 1 above under 35 USC 103(a). As to Claim 4, Belcher appears to be silent to the claimed particle size. The Examiner asserts that in this case the size of the particle fed into a melt extruder does not materially affect the claimed process, and that any particle size would have been prima facie obvious to the ordinary artisan. However, Takahashi also teaches pellets having an average diameter of 5 mm comprising polyethylene terephthalate (10:10-15). It would have been prima facie obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of Takahashi into that of Belcher in order to a) provide a dry feed line of material to an injection molding machine or extruder, b) provide pellets that are prevented from scorching, and c) to provide bottles of polyester having excellent properties such as high strength (All are found in Takahashi, 14: 49-62))."

As set forth above, Takahashi does not discuss a method for extruding then molding PET articles. Therefore, Takahashi cannot cure the deficiencies of Belcher in view of Schwarzkopf, discussed immediately above. None of these references, either alone or in combination, discloses at least step 2 of Applicant's process.

Applicant respectfully submits that the Examiner has failed to demonstrate the obviousness of Claim 4 under 35 USC 103(a), given Belcher in view of Schwarzkopf and Takahashi. Accordingly, Applicant respectfully requests that the Examiner reconsider and withdraw this rejection.

Applicant has made a sincere effort to, yet again, distinguish the claimed invention over the prior art. This prosecution has now dragged on for three years. Applicant has endured two previous Office Action rejections, and has gone through the time and expense of preparing and filing an Appeal. Rather than answering the Appeal, the Examiner has withdrawn the final rejection and instituted a new round of rejections. In all of that time, Applicant has not amended any of the Claims.

In the outstanding Office Action rejection, the Examiner has asserted in a rather cavalier manner that the primary references, Bright and Belcher, disclose cooling of the polymer melt stream as claimed by Applicant in step 2. Clearly they do not.

Applicant works for a small entity with limited resources. Applicant cannot afford to continue responding to such rejections. Therefore, Applicant respectfully requests that the Examiner involve his SPE in concluding the prosecution of this application.

If there are any matters that the Examiner wishes to discuss regarding this Response, he is cordially invited to telephone the undersigned attorney at 419-874-1100.